



# Biogenic/Abiogenic Hydrocarbons' Origin

## Possible Role of Tectonically Active Belts

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**Abstract.** The creation of hydrocarbons is linked to tectono-geologic processes and particularly to orogenesis, rifting, overthrusts, erosion, deposition of sediments, deep gas emissions, etc.. Many have claimed the inadequacy of plate tectonics in linearly explain a number of phenomena involved in hydrocarbons generation and geological processes, and many others defended the synthesis of hydrocarbons starting from inorganic minerals, proposing different geochemical processes. In this paper a possible mechanism for production of abiogenic hydrocarbons is proposed, linking it to a previously proposed orogenic isostatic model. While in plate tectonics the cold slab travels in contact with the lithosphere of the continental side, oxidizing materials faced to oxidizing materials, in this model a high-temperature reducing environment of undepleted mantle rises up and come in contact with the relatively cold oxidizing lithospheric environment. Non-lithostatic overpressures and a number of chemical reactions are then favoured in this sort of tectonic oxidizing-reducing pile, leading to a multiple origin of hydrocarbons. The actual situation along the Italian Apennines orogenic belt seems in accord to the proposed model in which an important role should have the abiogenic hydrocarbons in particular those produced by the tectonic working at the western margin of the Adriatic plate. However, albeit a continuous accumulation of hydrocarbons is witnessed by a number of planetary bodies of the Solar system, no evaluation of the abiogenic/biogenic hydrocarbons rate is yet possible on our planet.

**Key words.** Abiogenic hydrocarbons – Origin of hydrocarbons– Earth's expansion and degassing – Nonlithostatic overpressures – Italian oil and gas

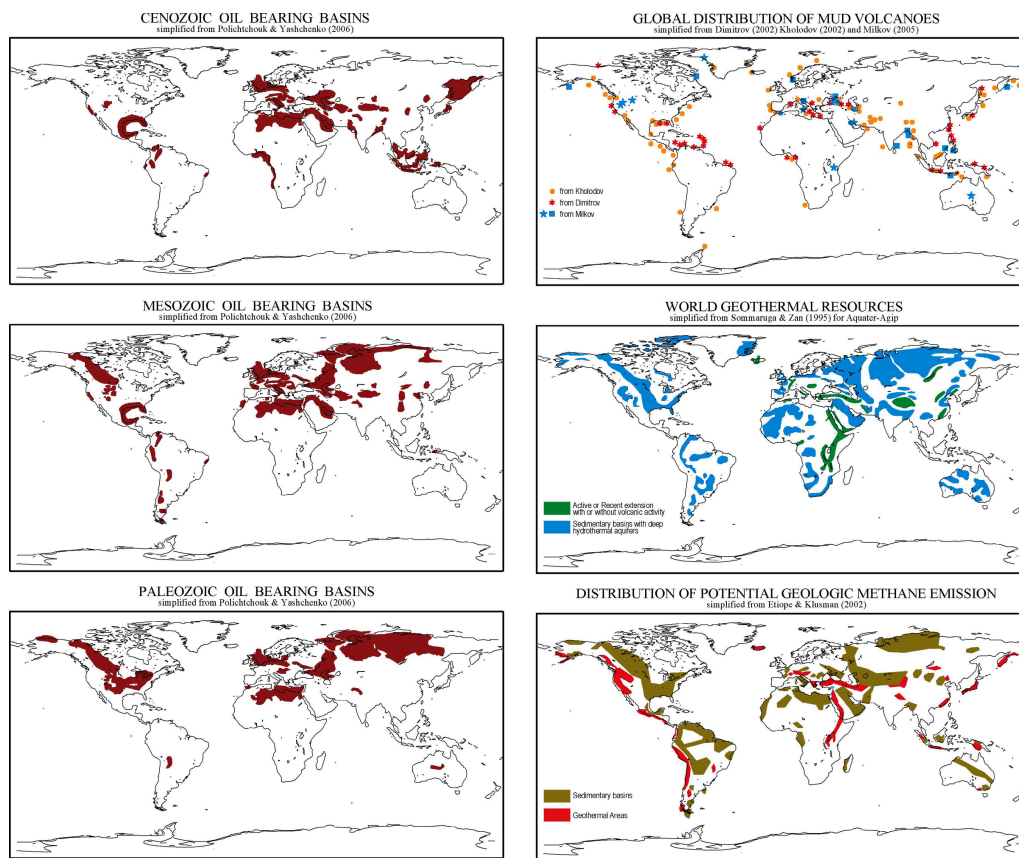
### 1. Introduction

It is nearly obvious that the creation of hydrocarbons is linked to tectono-geologic processes and particularly to orogenesis. Rifting, overthrusts, erosion, deposition of sediments, deep gas emissions, etc. all can contribute to the burial and to the metamorphosis of biogenic and/or abiogenic materials into hydrocarbons. But this connection with orogenesis should be expected to be different in the case of different global tectonic theories. Indeed, isolated voices have claimed the inadequacy of plate tectonics in linearly explain a

number of phenomena involved in hydrocarbons generation (Pratsch, 1978) and geological processes (Hilgenberg, 1974; Carey, 1975; Chudinov, 2001, part 3, on ore deposits; Scalera, 2006, 2007ab, 2008; Maxlow, 2012, this book).

Superimposed to this uncertainty in the effectiveness of the current global tectonics scheme, the second major field of debates is the biogenic or abiogenic origin of petroleum, or eventually the possibility of a mixing of the two generation processes (Colombo, 1972; Dmitrievskii, 2008).

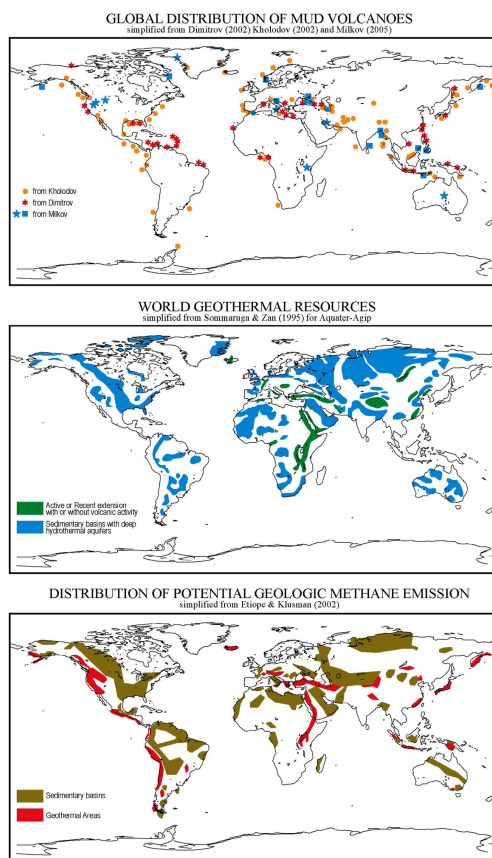
Historically, the abiogenic hypothesis on the petroleum' origin is very



**Fig. 1.** The relation between the distribution of hydrocarbons and their age. Upper Map: Distribution of Cenozoic oil-bearing basins. Central Map: Distribution of Mesozoic oil-bearing basins. Lower Map: Distribution of Palaeozoic oil-bearing basins. Redrawn and simplified from Polichtchouk & Yashchenko, 2006.

old. Mendeleyev (1834-1907), Berthelot (1827-1907), Vernadsky (1863-1945), Kudryavtsev (1898-1971), Porfir'ev (1899-1982), and many others defended the synthesis of hydrocarbons starting from inorganic minerals, proposing different geochemical processes (Dott & Reynolds, 1969).

Because the enormous strategic and economic importance of hydrocarbons extraction and exploitation, western researchers involved in petroleum geology have ever considered with great caution the claims of success of the abiogenic theory followers. They have been afraid to abandon the traditional field investigations methods scared by the negative con-



**Fig. 2.** The relation among the distribution of hydrocarbons and others tectonically related features. Upper Map: Distribution of mud volcanoes, drawn integrating maps of Dimitrov (2002), Kholodov (2002), Milkov (2005). Middle Map: Geothermal resources of the world, redrawn and simplified from Sommaruga & Zan (1995), in which recent rifting and hydrothermal aquifers are shown. Lower Map: Potential geologic methane emission regions, redrawn from Etiope & Klusman (2002). Mud volcanoes have a good fit with the Cenozoic Oil Bearing Basin. This is clue that where mud volcanoes are present but no oil fields are mapped, the region should be better explored (e.g. the southern tip of India). Low energy geothermal aquifers (blue areas in Sommaruga & Zan) can be associated to oil field, while the high energy Recent extensional regions (green areas in Sommaruga & Zan and red areas in Etiope & Klusman) generally are not concomitant with oil. This evidence is in agreement to the new proposed model because the initial extensional phases cannot produce deep or shallow suitable conditions to hydrocarbons formation.

sequences and damages on western economy if the new way of survey reveals unreliable. Today the situation is still largely

unresolved. Progressively more numerous there are becoming the evidence supporting the abiogenic origin of many compounds that are found in the oil reservoirs and elsewhere, and the western geologists are today admitting that some oil fields are of abiogenic nature (Horita & Berndt, 1999; Fiebig et al., 2004; Kitchka, 2004; Sherwood Lollar et al., 2006; Fiebig et al., 2007; Sherwood Lollar et al., 2008; and many others). The undeniable co-presence of both biogenic and abiogenic signatures – in various rates – in most hydrocarbons fields should be considered the true important clue in defining new models of gas and oil formation or in choosing among the existing ones. In the following pages I will try to assess the possibility of a recently proposed model of fold belt evolution to be in agreement – and in what limits – with the observed phenomena.

## 2. Biogenic and abiogenic field evidence

The biogenic theory is corroborated by many biomarkers (e.g. oleanane linked to angiosperms) with undoubted link to the flora that existed in that geologic epoch (Mello & Moldowan, 2005) and to the actual deposition into sediments of air dispersed organic volatile materials or buried plants (Brooks, 1948; Hobson & Tiratsoo, 1975; among others) and remnants of animal life. Many types of oils are indicative of a rapid deposition of the organic source material into subsiding basins, and this is in accord with geologic evidence. Evidence are also clear that a number of complex substances in the petroleum have a thermo-labile behaviour and never experienced high temperatures. The depletion of  $^{13}\text{C}$  in the oil fields and in diamondoids is considered a further evidence because the chlorophyll cycle favour the retention of  $^{12}\text{C}$  (but different explanations are possible).

Some isotopic markers are of clear abiogenic origin, and especially the presence of Helium witnesses for a deep origin of the material flux. Some enrichment and depletion in isotopic species are also con-

sidered clues of a deep and then abiogenic origin.

Many findings of abiogenic methane and HCs have been reported in association to serpentinitised rocks (Szatmari et al., 2005; Sachan et al., 2007) and other geological environments (Horita & Berndt, 1999; Fiebig et al., 2004; Sherwood Lollar et al., 2006; Fiebig et al., 2007; Sherwood Lollar et al., 2008). Experimental evidence that HCs can be naturally produced by abiotic chemical reactions is growing (Giardini & Melton, 1981; Scott et al., 2004; Martinelli & Plescia, 2005).

The old and main critique (frequently discussed starting from the second half of 19th century; Brooks, 1948) of the followers of inorganic origin of petroleum is that the temperatures evaluated from the geologic history of many reservoirs was not sufficient to the process of oil distillation envisaged by the first biogenic conceptions. Many other arguments and factual data about abiogenic origin can be found in Hedberg (1969), Porfir'ev (1974), Glasby (2006), Katz et al. (2008).

## 3. The theory of Thomas Gold

The astrophysicist Thomas Gold started in the years seventieth a series of papers about the role of a possible ascent of mantle fluids in producing – under some conditions – hydrocarbons and oil. The earthquakes play a special role in Gold's ideas, because the rise of fluids can be made easier – if not possible – by the fractures induced by earthquakes in the crust and lithosphere. Indeed, Gold & Soter (1980) compiled a map of the correlation between oil fields and earthquake-prone belts (modern and in geological past), in which was highlighted the presence of both the phenomena in common zones.

The Thomas Gold theory of deep origin of HCs hypothesised a depth of 100 to 300 km for the formation of simplest HCs like methane (Gold, 2001). These compounds acquire their apparent organic origin by contamination and interaction with deep microbial life during the last ten km of their migration towards the crust. The

real presence of a deep microbial habitat is today an ascertained fact (Pedersen K., 2000; Schulze-Makuch & Irwin, 2004; Head et al., 2003). Albeit Gold estimation of the amount of the mass of carbon linked to subsurface life was too exaggerated (Gold, 1992), recent estimate reach a value of  $325 - 518 \times 10^{15}$  g, nearly equal to the value ( $561 \times 10^{15}$  g) of the sum of dry-land and marine life (Fyfe, 1996; Whitman et al., 1998). Finally, the presence of helium – a primordial mantle element – in HCs fields was judged by Gold as evidence favouring the deep origin of petroleum.

Many criticism has been reported to the Gold's model (Glasby, 2006). Among these, the main problems are: the transformation of methane to higher HCs is not possible in the depth above 100 km (see the Kenney's theory on the thermodynamic impossibility of this, 2002) and the bacteria in the upper crust cannot overcome this energetic impossibility because they eat to get and not to dissipate energy. The  $^3\text{H}/^4\text{H}$  rate was required to be low in Gold conceptions because a sort of washing away operated by the methane flow, but a higher than normal  $^3\text{H}/^4\text{H}$  was observed in the HCs fields. Many other criticisms can be read in the book-review of Peters (1999) and in Laherrere (2004) and Pfeiffer (2005).

All the preceding arguments make partially invalid the Gold's mechanism for oil formation, albeit his more general view of a slow expulsion of hydrocarbons from the interior of the planets has been confirmed by the presence of methane on several Solar System orbiting bodies (Cruikshank & Apt, 1984; Spencer et al., 1990; Lunine et al., 1999; Hand, 2008; Mumma et al., 2009; among others). Hydrocarbons are contained in carbonaceous chondrite meteorites and a large amount of methane and hydrocarbons has been detected on the surface of Titan (Saturn's moon) where no biological remains of surface life can exist (Lunine et al., 1998; Lunine et al., 1999; among others). Recently definitive evidence of methane emissions on the high-

lands of Mars has been found (Hand, 2008; Mumma et al., 2009).

My personal criticisms are:

i) Gold does not envisage different geodynamical scenarios with respect to plate tectonics. He assumes subduction as a real ongoing geological-physical phenomenon. This is the reason why:

ii) he cannot see both the exiguity of the role he assigned to the seismic events and:

iii) the important information provided by the unsuccessful experiment of the deep borehole in the old ( $\approx 360$  My, the Siljan Ring) impact crater in Sweden (Gold, 1987, 1991, 1993; but he firmly maintains that oil was found).

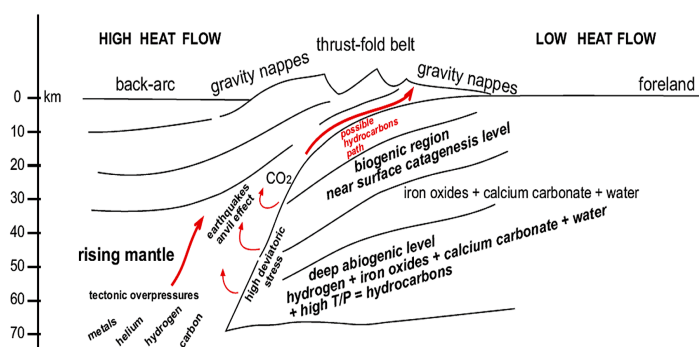
I will show that the three weaknesses in his interpretation are interrelated.

#### 4. The Russian-Ukrainian framework

The Russian tradition about biogenic/abiogenic oil formation is very old and both the frameworks were defended by their scientists. (Lomonosov, organic; Mendeleiev, abiogenic; and many others in historical times in both parties).

More recently Elansky (1966) and the Ukrainian Chekaliuk (1967) proposed a HP/HT mechanism of oil formation starting from mineral carbon ( $\text{CO}_2$ ), hydrogen and methane. These chemical reactions are argued to happen in the mantle during serpentinization in presence of magnetite. Today Kitchka (2004) is proponent of a model of oil and gas accumulation that occurs by slow vertical migration and coalescence of HCs fluid inclusions through a fractured lithosphere and crust. Porfir'ev in its review of 1974 explained most arguments against the organic theory and he presents the history and reasons – with the limitations of the level of scientific research at the time – of the inorganic origin idea.

Many others worked adopting the abiogenic conceptions and Szatmari (1989) proposed that the industrially adopted Fischer-Tropsch synthesis of artificial oil could also occur in upper lithosphere. The needed high temperature and the too oxidizing state of upper mantle is a serious



**Fig. 3.** The connection between the proposed model (Scalera, 2007b, 2008, 2010) and various kind of hydrocarbons generation. The convergence of cold and hot materials, oxidizing and reducing environments, the presence of high nonlithostatic overpressures, and ascending fluids and catalysts, constitute a favourable dynamical environment in which different types of metamorphism can be realized at shallower depth, ore deposits can form near the surface by concomitant self-organization processes and the synthesis of biogenic and abiogenic hydrocarbons can occur at depths not exceeding few tens of kilometres.

problem for the validity of the Szatmari's idea. This criticism has been recognised by Kenney et al. (no date) – a collaborator of Gold in the Sijian Ring drilling enterprise –, who has proposed what is considered the modern version of the abiogenic framework (Kenney et al., 2002). In their conceptions, the hydrocarbons are formed from abiogenic methane, but this is possible – because of the constraints of the law of thermodynamics – only to pressures greater than 30 kbar (depth > 100 km) and temperatures > 700°C. This great depth was formerly argued by Vernadsky (1933). If the environment is oxidizing – as it is in the upper part of the upper mantle, the impossibility to transform the organic remains of plants (carbohydrates) into hydrocarbons and oil follows from thermodynamics (Kenney et al., 2002). Kenney's physical analysis is well grounded and experimentally confirmed (Scott et al., 2004) but somewhat static and formal. He does not take into consideration the real dynamical conditions of the lithosphere, which physical state can be very different from his postulates.

### 5. Possible new harmonic scenario of the hydrocarbons formation

As it has been shown in the preceding sections, all the conceptions of the proponents

of abiogenic theories are in some aspect lacking of some important aspect of the geophysical reality. We have then to ask ourselves if the difficulties to fully explain the origin of petroleum are caused by the deficiencies of the currently accepted global tectonics.

Oil and associated phenomena can be found preferentially along old fold belts and margins (Fig. 1 and 2) which building models can be very different in different global tectonics theories. The fold belt building model proposed in preceding papers by Scalera (2007b, 2008, 2010) can be used to judge if the several difficulties encountered by the different biogenic/abiogenic conceptions can be solved (Fig. 3). In Fig. 3 the main characteristics of the model are shown in connection to the abiogenic/biogenic oil production problems.

Together with the higher temperatures available in the model of Scalera (2007b, 2008, 2010) at shallower depth, the tectonic overpressures (Mancktelow, 1995; Mancktelow & Gerya, 2008), can bear a relation with the synthesis of biogenic and abiogenic hydrocarbons.

Glasby et al. (2004) argued that most HCs fields occur in areas of higher than normal thermal gradient, and the above proposed model leads just to higher gradients that are produced by the isostatic

uplift of very deep materials (from and above the transition zone). These higher gradients together with uplifted contents of mantle metals (catalysts) and hydrogen, can favour the occurrence of the conditions leading to the development of the Fischer-Tropsch reaction.

The underthrust carbonate slabs – formerly produced in the basin-rift phase – can interact at proper high temperature with hydrogen and catalytic metals. Pressure range can be very wide both because the nonlithostatic overpressures (Mancktelow, 1995; Mancktelow & Gerya, 2008) at the boundary between uplifting material and adjacent stable or underthrust lithosphere and occasionally because the inevitable occurrence of strong earthquakes (to be also considered a further supply of energy) in some periods of the thrust-fold belts building (Fig. 3 and 4). Laboratory experiments (Martinelli & Plescia, 2005) have recently ascertained that calcareous-marly rocks to which friction is applied produce a strong emission of carbon dioxide and methane of inorganic origin.

The compressional state of the gravity-driven nappes, together with the general rifting environment of the proposed model and the aperiodic activation of deep phase changes with extrusion of material below the fold belts, can be a substantial facilitating factor in oil migration towards the surface and its accumulation under impermeable layers, following the slopes of the underthrust strata. The negative experiment of the Sijlian Ring meteoritic crater drilling can be fully interpreted in this new framework as a proof of the insufficiency of the simple fracturing of the crust and lithosphere in favouring a surfaceward transferring of deep methane and other HCs. It needs a surfaceward uplift of deep materials, with an associated lithospheric fracturing provided by a rifting and/or thrust-fold belt building, to trigger, additionally, the Fischer-Tropsch reaction.

The recurrent criticism (Glasby, 2006) of the lack of reducing condition in the upper part of the upper mantle to be possible

the Fischer-Tropsch reaction, is then overcome in this model by the upwards isostatic transport of the reducing transition zone environment (Fig. 3). Also the criticism of Kenney that the suitable TP conditions to produce HCs can be found only at depth greater than 100 km is overcome by the transport of such conditions toward the surface (Fig. 3).

The higher than normal  $^3\text{He}/^4\text{He}$  rate that is observed in the HCs fields can properly be explained by the uplifting of undepleted mantle material, overcoming the difficulties explained by Peters (1999). Then, the results of Polyak (2005) based on isotopic and heat flow data (higher  $^3\text{He}/^4\text{He}$  in areas of higher heat flow, and lower heat flow in areas of higher continental age. A surfaceward flow of silicate matter can explain the observation) – substituting his diapiric rising with an isostatic rising mechanism (as in my new proposed model) – can be considered an important support to this new proposed scheme.

The becoming very near, practically adjacent, of the coming-from-depth reducing materials and the upper mantle oxidizing zone can be, in association with tectonic and seismic overpressures, the real forge zone – a sort of tectonic pile – of hydrocarbons as well as of many kinds of metamorphisms. The criticism of Kenney that the suitable TP conditions to produce HCs can be found only at depth greater than 100 km is then overcome by the transport of such conditions toward the surface (Fig. 3).

While in plate tectonics the cold slab travels in contact with the lithosphere of the continental side, oxidizing materials faced to oxidizing materials, in my framework a high-temperature reducing environment of undepleted mantle rises up and come in contact with the relatively cold oxidizing lithospheric environment. It is easy to check that in the interposed region of thermal gradient, and of hydraulic gradient due to non lithostatic overpressures (Mancktelow, 1995; Mancktelow & Gerya, 2008) – all at depths not overcoming few tens of km – a continuum of very different physicochemical conditions come in

existence. A number of chemical reaction are then favoured in this sort of tectonic oxidizing-reducing pile, leading to a multiple origin of hydrocarbons. However, no evaluation of the abiogenic/biogenic hydrocarbons rate is yet possible.

In addition, near to the surface – in the first few tens of kilometres – a considerable amount of fluids (Fyfe, 1978) and of organic biogenic material of various provenance is present in the underthrust sedimentary layers, which can participate in a passive way (contaminant) or active way (transmuting materials, kerogens) to the HCs forming.

The many times claimed (Bastin, et al., 1926; Gold, 1992, 2001; among many others) and today ascertained (Head et al., 2003; among others) reality of the underground bacterial life can be an additional factor in production of catalytic elements and/or in the biodegradation of HCs to heavy oil.

We should expect that an asymmetry in the amount and distribution of the HCs fields should result crossing an active margin. The cold side of these regions (e.g. the continental side of the Apennines, the Andes, etc.) should be more suitable for petroleum exploration, because the squeezing of fluids caused occasionally by the aperiodic overpressures towards the decreasing horizontal hydraulic gradient. The horizontal flow toward the warm side should with great probability disintegrate the heavy HCs molecules, while they should conserve integrity going toward the cold region. It should be a matter of on-field experiments (drillings) to test if HCs are accumulated under the axial zone of the thrust-fold belts.

## 6. The Italian scenario of the hydrocarbons formation

A comparison of the Italian hydrocarbon fields with some major geophysical-geological features of the Italian region (see in Fig. 4 and 5 the hydrocarbons, CO<sub>2</sub> emissions, heat flow, volcanic, seismic, gravimetric, magnetic features) is useful to roughly test the model. A simple compar-

ison of the petroleum and gas fields (data from Pieri, 2001) with the maximum felt intensity (VIII, XI, X and XI MCS degrees) shows a initial good agreement of the model and the highest seismic energy release. The earthquakes seems to enclose an elongated area of tectonic working in which hydrocarbons can be produced in the depts. and then expelled laterally toward the cold side of the region.

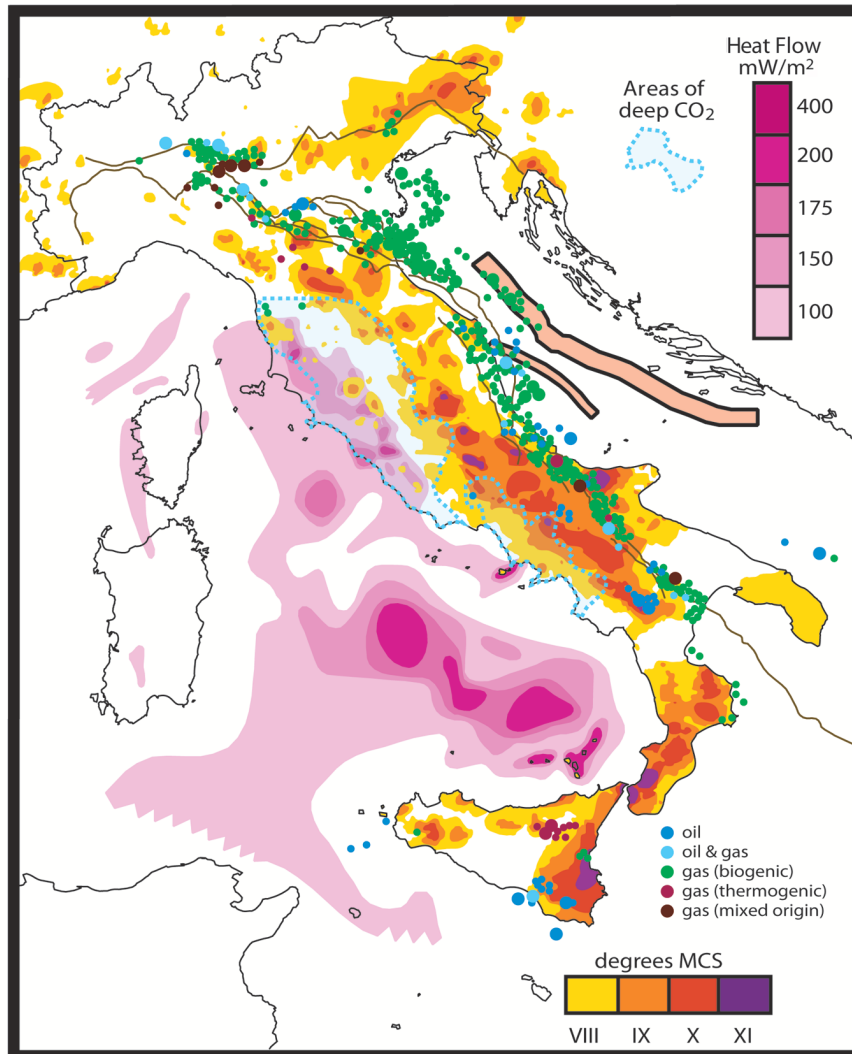
The "warm side" can be considered the region where the volcanic rocks and the highest-degree seismicity are located (Fig. 4 and 5). On this side HCs cannot migrate without be disintegrated. The oil and gas could benefit of the same mechanical action of the high stress indicated by the earthquakes in creating microfractures (before their coalescence in a bigger fault; see Crampin, 1999), through which these fluids can migrate towards oil fields or the surface. This migration can become true expulsion with local firing during a seismic event. In Fig. 5b (from Caratori Tontini et al., 2004) the magnetic anomaly elongated from Ancona to Calabria is nearly coincident with the oil-gas fields pattern and is the indication of the western edge of the Adriatic plate.

Albeit the pattern of the oil fields does not reflect exactly the real oil-gas distribution – in the sense of a possible wider and different distribution if numerous new finding will be discovered – the actual situation seems in accord to the proposed model in which an important role should have the abiogenic hydrocarbons in particular those produced by the tectonic working at the western margin of the Adriatic plate. Deeper investigations and analyses need in determining the the real rate (biogenic/abiogenic) of the Italian hydrocarbons.

## 7. Conclusions

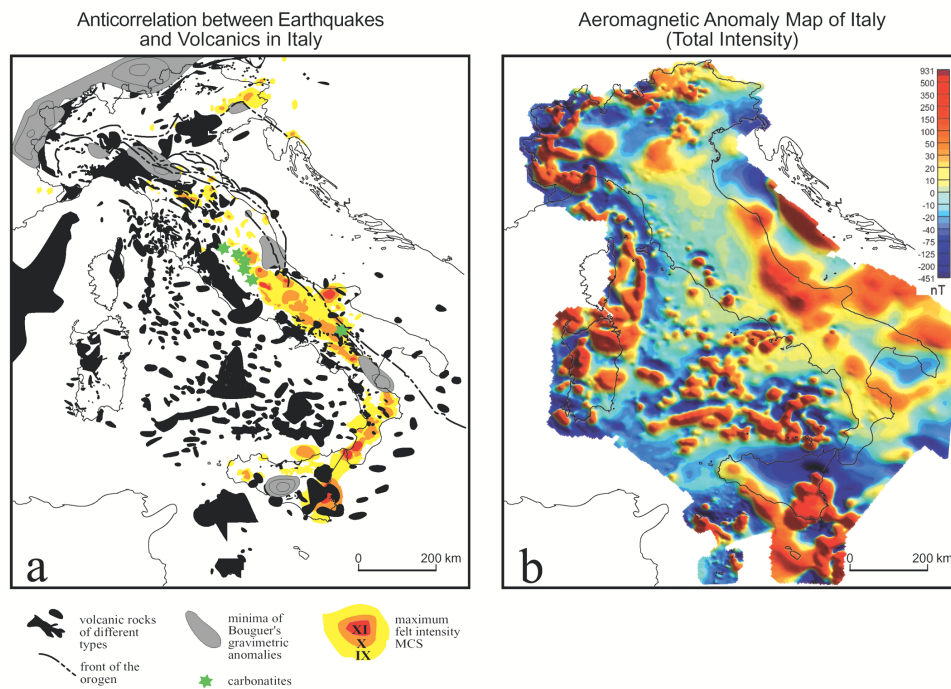
The existence of huge amounts of hydrocarbons on the surface of little planetary bodies of the Solar System can have a more deep meaning. It is perhaps premature to draw definite generalization from few facts still insufficient to be linked in a rigorous

### Hydrocarbons, Maximum Felt Intensity in Italy, Deep CO<sub>2</sub> Highest Emission & Heat Flow



**Fig. 4.** The data of locations and productivity of hydrocarbon fields in Italy are from Pieri (2001). The maps of the MCS degrees from VIII to XI is extracted from the Maximum Felt Intensity in Italy that was elaborated by INGV (Boschi et al., 1995). The front of the orogen is also shown (from Bigi et al., 1991). The hydrocarbons are located beside the eastern side of the highest seismic energy releases. The further adding to this map of the zones of heat flow greater than 100 mW/m<sup>2</sup> (redrawn from the map by Della Vedova et al., 1991) shows that a similar warm/cold zonation exists like the one proposed in the model (Fig. 3). Highest CO<sub>2</sub> emissions (Chiodini et al., 2004) can be of mantle origin or can be produced by the margin of the underthrust carbonatic platform with the help of the earthquakes. Adjacent to the eastern side of the higher degree seismicity, and following the Adriatic plate margin (revealed by a long magnetic anomaly; see Fig. 5b), the hydrocarbons has been found in commercial quantities. They can mostly or partially came from the chemical reactions envisaged in this paper, and then pushed toward east by hydraulic gradients and favorable disposition of microfractures and impermeable sedimentary layers. The two flesh ribbons in the Adriatic sea represent main seismogenic faults (Basili et al., 2009) along which new HC fields may be found.





**Fig. 5.** In a) a comparison is shown between the higher values of the maximum felt intensity (IX, X, XI MCS degree) (Boschi et al., 1995) and all the volcanics (black areas) that are reported in "Structural Kinematic Map of Italy" (Bigi et al., 1991), in "Magnetized Intrasedimentary Bodies" (Cassano et al., 1986), and in Lavecchia & Stoppa (1996, carbonatites). The more energetic Apenninic seismicity is confined in the gaps of volcanics, and mainly immediately west from the orogen front. Recently discovered carbonatites (green stars) help to better define the anticorrelation between volcanics and earthquakes. Another factor of inhibition of seismicity is the presence of minima of the Bouguer gravimetric anomaly, which are related to greater crustal thickness and/or to different characteristics of the crust. In b) a long alignment of large positive magnetic anomalies is recognizable in the total intensity map (Caratori Tontini et al., 2004) from Ancona to Calabria (similar result, although higher frequencies are shown, in the map of Chiappini et al., 2000), which seems to delimitate the western boundary of the Adriatic lithosphere, where phenomena of extrusion of the magnetic basement are possible (Speranza & Chiappini, 2002).

logical chain, but the generation of hydrocarbons on planets, the born of the underground and surface life, its thriving evolution, and some still unexplained properties of our Earth – such as its slow expansion (Scalera 1990, 1993, 2001, 2003; Scalera & Jacob, 2003; Lavecchia & Scalera 2006) –, appear so inextricably mutually linked to be deserving of guesswork.

Ever more, the Earth is not the mere scenarios of the happenings, but its role is important in driving them. The creation of a still not assessable amount of hydrocar-

bons by tectonic activity – driven by the global expansion – and the possibility that also the primordial life has been promoted by the same geodynamic behaviour of the active margins evoke wonderful views.

If Croizat (1962) has for a long time defended the active role of tectonics in the process of creating vicariance and speciation (Humphries & Parenti, 1986), we can today envisage the same important involvement of tectonics in creating in the Earth's depth the first organic self-reproducing molecules, preceding perhaps

the surface life. And also we have to question ourselves how can be that similar tectonic mechanisms can have acted on so small celestial bodies, and what can be the energy able to sustain such processes on planetary moons. Tectonic processes are possibly in activity, for example, on Titan (Lorenz, 1996; Lorenz & Lunine, 1996). Can be that the problem of the origin of petroleum – to all the appearance only relevant for the prosperity of humankind – is in fact a clue or a key for solving more general problems – geological, cosmological and also eschatological? Is this only a beautiful dream?

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